

REMARKS

This Amendment is respectfully submitted in response to the Office Action dated February 12, 2007. Claims 1 to 5 and 7 to 33 are pending in the application. To place this application in condition for allowance, Claims 5, 8, 11 to 17, 32 and 33 have been canceled without prejudice or disclaimer. Applicants reserve the right to file any and all of these claims in a continuing application. Claims 1, 4, 7, 9, 10, 19, 21, 23 to 24, 26 to 28 have been amended. Claims 34-41 have been added as new claims. No new matter has been added by the amendments or new claims. The Commissioner is hereby authorized to charge deposit account 02-1818 for any fees which are due and owing.

According to the Office Action, the subject matter of Claims 5, 28, 32 and 33 is directed to non-elected subject matter. Applicants have canceled Claims 5, 32 and 33 and have amended Claim 28 to delete reference to non-elected subject matter in the claims. Accordingly, Applicants submit that the objection to Claims 5, 28, 32 and 33 should be withdrawn.

Claim 4 was objected to for use of the abbreviation IS to refer to the bacterial insertion sequence *SI*. Claim 4 was also rejected under 35 U.S.C. §112, second paragraph for being indefinite as to what is the “functional equivalent” of bacterial insertion sequence *SI*. Applicants have amended Claim 4 to clarify that the abbreviation, “IS” corresponds to the term, “insertion sequence” and have deleted reference to the functional equivalent of *ISSI*.

Claim 5 was objected to for use of the term “chosen”. In view of the cancellation of Claim 5, such objection is now moot.

Claims 1 to 7, 9 to 10 and 18 to 27 were objected to for informalities that have been corrected. Applicants respectfully submit that the objections have been overcome.

Claims 7, 20, 24 and 27 were rejected under 35 U.S.C. §112, second paragraph, for allegedly being indefinite as to where ORF 1560 is located. Applicants have amended Claim 7 to indicate where ORF 1560 is located and respectfully submit that this rejection has been overcome.

Claims 9, 10 and 21 were rejected under 35 U.S.C. §112, first and second paragraphs, for the use of the phrases “substantially prevented” and “sufficient DNA”. Applicants have amended Claims 9, 10 and 21 to eliminate the use of the phrase “substantially prevented”.

Applicants have further amended Claims 9, 10 and 21 to clarify that the modification of the bacterial chromosome is sufficient to disrupt expression of a chromisate mutase chain A gene. Therefore, Applicants submit that the rejection has been overcome and should be withdrawn.

Claim 2 was rejected under 35 U.S.C. §112, first paragraph, for alleged lack of enablement for not making a deposit of the Sf1 and Sf1c16 strains of *S. thermophilus*. In contrast to the suggestion in the Office Action, the Sf1 and Sf1c16 strains of *S. thermophilus* are known and readily available to the public. Evidence that the Sf1 strain of *S. thermophilus* is known and readily available to the public can be found in the publication cited in the Office Action to Foley et al. entitled "A Short Non-Coding Viral DNA Element Showing Characteristics of a Replication Origin Confers Bacteriophage Resistance to *Streptococcus thermophilus*" published in Virology 250(2): 377-87 on October 25, 1998 ("Foley"). As described in the Specification at page 8, lines 5-14, the Sf1c16 strain of *S. thermophilus* is a lysogenic derivative of the Sf1 strain of *S. thermophilus*. Therefore, Applicants respectfully submit that the Sf1 and Sf1c16 strains of *S. thermophilus* are known and readily available to the public and can be made or isolated without undue experimentation. Accordingly, Applicants submit that such strains do not require deposit under 37 C.F.R. 1.801-1.809.

The Office Action maintained the rejection of Claims 1-4, 6-7, 9-10 and 18-27 under 35 U.S.C. §112, first paragraph for alleged lack of enablement. The Office Action alleges that the Specification is not enabling for any or all *S. thermophilus* strains. Applicants respectfully submit that the successful demonstration of resistance to attack by at least one bacteriophage in the wild type Sf1 strain of *S. thermophilus* is enabling for such resistance in any or all *S. thermophilus* strains. As set forth in the Specification at, for example, page 6, lines 26-31, the Sf1 strain of *S. thermophilus* is "extremely susceptible to phage attack". In fact, the Sf1 strain of *S. thermophilus* can be infected by nearly 25 times more phages than other typical strains of *S. thermophilus*. Therefore, successful demonstration by Applicants of resistance to phage attack in the Sf1 strain of *S. thermophilus* is enabling for resistance of phage attack in any or all *S. thermophilus* strains.

The Office Action further suggests that the claims must indicate "which specific DNA is added affecting which bacterial gene." Applicants have amended the claims to indicate that it is

the chorismate mutase chain A gene that is affected by the modification of the bacterial chromosome of *Streptococcus thermophilus*.

Claims 1, 3-5, 7, 9-10, 18-21, 23-24 26-28 and 30-32 were rejected under 35 U.S.C. §112, first paragraph for alleged lack of enablement. Applicants have amended Claims 1, 9, 10, 21 and 28 to include modification of the bacterial chromosome sufficient to disrupt expression of a chorismate mutase chain A gene. As acknowledged in the Office Action, page 8, the Specification is enabling for a modification of a prophage or bacterial chromosome of *S. thermophilus* leading to the disruption in expression of chorismate mutase chain A gene. Accordingly, for at least these reasons, Applicants submit that the rejections under U.S.C. §112 have been overcome and should be withdrawn.

The Office Action has maintained the rejection of Claims 1-2, 7, 9-10, 18, 20, 22, 24 and 28-31 as being anticipated by *Foley*. The Office Action also rejected Claims 3-4, 19, 21, 23 and 25-27 as being unpatentable over *Foley* and further in view of Sturino M. et al. entitled "Construction of Bacteriophage-Resistant Strains of *Streptococcus thermophilus* by pGh9::ISS1 insertional mutagenesis" published in Journal of Dairy Science 81(Supp. 1): 7 in 1998 ("*Sturino*").

As acknowledged in the Office Action at page 17, *Foley* does not disclose the modification of *Streptococcus thermophilus* by addition of DNA comprising ISS1 into the bacterial chromosome or use of the bacteria or milk products with the modified bacteria. Applicants respectfully submit that *Foley* also does not disclose a *Streptococcus thermophilus* bacterium resistant to attack by at least one bacteriophage which comprises modification of the bacterial chromosome sufficient to disrupt expression of a chorismate mutase chain A gene. Applicants further submit that *Foley* does not disclose deletion of DNA from at least part of ORF 1560 of the ϕ Sfi21 prophage to disrupt expression of the prophage.

The Office Action relies on *Sturino* to cure these deficiencies. However, *Sturino* does not teach or suggest a *Streptococcus thermophilus* bacterium resistant to attack by at least one bacteriophage which comprises modification of the bacterial chromosome sufficient to disrupt expression of a chorismate mutase chain A gene as in Claims 1, 9, 10 and 21. In addition, *Sturino* does not teach a *Streptococcus thermophilus* bacterial strain, wherein at least one of a bacterial chromosome or a ϕ Sfi21 phage genome of said strain is modified such that phage

replication within the bacterium is prevented, wherein the modification is selected from the group consisting of addition of DNA to the bacterial chromosome in ORF 90 at a site which disrupts expression of a chorismate mutase chain A gene and deletion of DNA from at least part of ORF 1560 of the ϕ Sfi21 prophage to disrupt expression of said prophage as in Claim 28. Therefore, neither *Foley* nor *Sturino* disclose each and every element of the claimed invention. Accordingly, Applicants respectfully submit that the rejections under USC §102 and §103 have been overcome and should be withdrawn.

For the foregoing reasons, Applicants respectfully request reconsideration of their patent application and earnestly solicit an early allowance of same.

Respectfully submitted,

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